# Agilent TS-8900

PXI Functional Test System

Technical Overview

## A Functional Test System

- For industries that require low to high voltage, high throughput functional test
- Suitable for medium to high pin count device under test (DUT)
- That uses industry standard PXI, GPIB and LXI instrumentations

TS-8900 is the latest standard platform of end-of-line functional test system in electronics manufacturing. Designed to reduce your cost of test, the TS-8900 achieves this by providing a higher throughput and higher test coverage while reducing your equipment capital cost.
It is ideal for medium to high channel count applications in various industries like:

- Automotive
- Aerospace and Defense
- Electronics manufacturing

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## TS-8900 Platform Overview

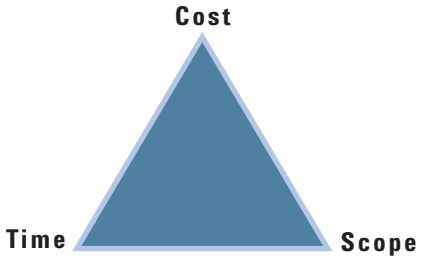
The Agilent TS-8900 provides a cost effective solution to manufacturers that are constantly under pressure to perform functional test their DUTs at a faster and lower cost than their competition without compromising test coverage.

The TS-8900 is a standard off-the-shelf PXI-based platform designed for electronics functional test. This provides the benefits of enabling test development engineers to perform faster test development, execution and line integration.

With instruments engineered specifically for electronic applications to meet 3 critical components of:

- time to deployment
- flexibility to accommodate a wide scope of electronics functional test that have high power, high switching and parallel test requirements
- decreasing the total cost of test

The TS-8900 comprises of a standard platform with test system of both hardware and software that is easily modified to suit your particular test strategy and range of electronics test.




The TS-8900 is scalable to meet manufacturer's needs that have requirements to deploy end-of-line test systems that can start small and then scale up as their production capacity needs increase with time, thus keeping cost of tests low.

## TS-8900 Platform Characteristics

### Speed

The TS-8900 was designed specifically for DUTs with medium to high pin count in mind. With high voltage, current and channel count support built-in the load, stimulus and instruments of the system, customers are able to adopt new test methodologies like parallel testing cost effectively while increasing throughput.

### Scalability

The TS-8900's modular design empowers customers to design & deploy systems that are scalable from for example a 1 DUT functional test system to a 4 DUT functional test systems that is able to test 4 DUTs simultaneously. Hence customers have the flexibility of growing their functional test systems capacities as the demand grows.

### Accuracy and repeatability

Equipment stability and signal paths used during the test measurement are automatically compensated based on calibrated data (e.g. Sense Input feature). This provides customers accurate loads, stimulus and measurements resulting in repeatable tests. TS-8900 leverages the measurement speed, accuracy, and repeatability strengths of Agilent instruments, creating reliable and high performance electronics functional test systems.

### Global standard and single vendor support

The TS-8900 provides a standard platform with Agilent global support to customers. This is achieved via TS-8900 compliance to various global safety standards and Agilent's global support infrastructure, thus lowering the total cost of test for customers where they can develop once and deploy everywhere.

## Serial communication

TS-8900 provides customers with support for the following communication protocols:

- 2 CAN channels in acc. with ISO 11898 and CAN 2.0B with 11-/29-bit identifier
- LIN master or LIN slave node; operation alternative to ISO 9141-2
- K– and L-line for 12 V and 24 V vehicle systems with 256 kBaud max.

## Power sources

The TS-8900 provides customers with modular power supplies that support up 3300W. Customers have the following modular power supply options to select:

- N5744A DC System Power Supply, 20 V, 38 A, 760 W
- N5745A DC System Power Supply, 30 V, 25 A, 750 W
- N5764A Power Supply, 20 V, 76 A, 1520 W
- N5765A Power Supply, 30 V, 50 A, 1500 W
- N8734A Power Supply, 20 V, 165 A, 3300 W
- N6702A Low-Profile MPS mainframe, 1200 W
- N6702A Low-Profile MPS Mainframe, 1200 W

The N5700 series provide users with an easy to integrate, cost-effective and high power density power supplies that starts from a 1U rack space. The N8734A provides up to 3.3 kW in a 2U rack package with flexible AC input voltage options. It supports USB, LAN (LXI C) and GPIB interfaces providing customers with more interface flexibilities.

## Measuring/stimulus instrumentation

The TS-8900 stimulus and measurement instruments are categorized in the following :

- PXI-interface instruments (M9186A, M9216A, M9185A, M9182A, M9183A)
- LXI-interface instruments (L4532A, L4534A, L4451A)
- GPIB-interface instruments (33521A, 33522A, 53220A)

## PXI-interface instruments

The PXI interface instruments for TS-8900 comprises of the following:

- M9186A Isolated Single Channel Voltage/Current Source, 100 V
- M9216A High Voltage Acquisition module, 32-Channel, 250 kS/s, 16-bit, 100 V Input
- M9185A Isolated D/A Converter, 8/16 Channels, 16-bit, 16 V
- M9182A Digital Multimeter, 6½ digits, PXI
- M9183A Digital Multimeter, 6½ digits Enhanced Performance, PXI
- M9187A PXI Digital IO: 32 inputs, 32 outputs, 0.3V to 50 V

With support for high voltage-current range, SENSE input and safety interlock features, the M9186A offers customers an elegant voltage-current source that does not require conditioning circuitry with accurate and repeatable results while protecting the DUT and instrument from damage due to high voltage spikes.

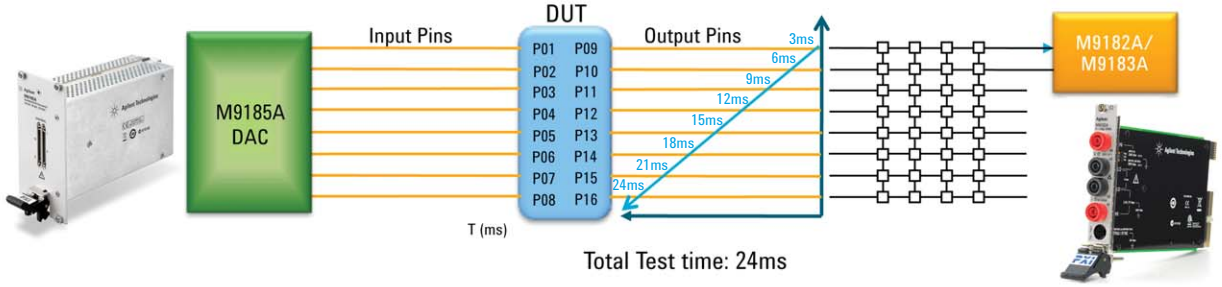
The M9216A provides users up to 32 voltage measurement channels with a 10mV – 100V auto measurement range in 1 single PXI card. This new high voltage acquisition module enables customers to improve their voltage measurements throughput by 30% - 60% via new parallel test methodology compared to the current sequential measurement methodology using a digital multimeter (DMM) and switch matrix. With a sampling rate of 250ksamples/s per channel, the M9216A supports measurement of higher frequency signals of up to 100kHz.

## New test methodology: Parallel vs sequential voltage measurement

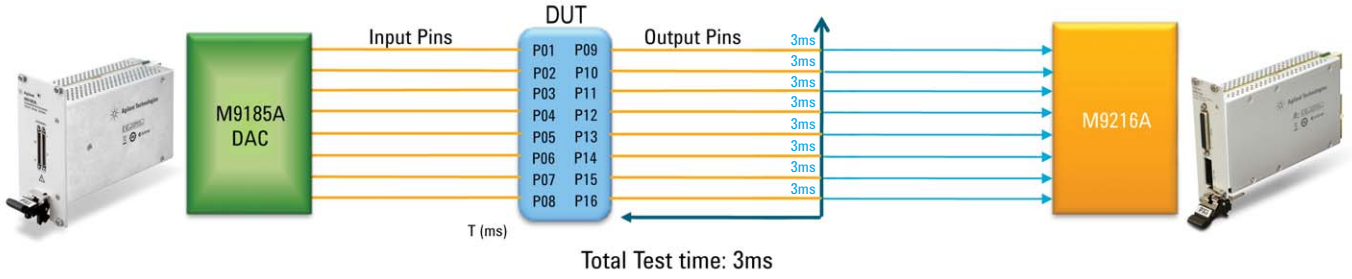
The M9216A empowers customers with improved throughput via parallel voltage measurements compared to the industry standard of sequential measurements. With reference to Fig 1 below, the M9216A enables voltage measurement improvements of up to 30% compared to sequential measurements using a Digital Multimeter and switch matrix configuration.

The M9182A and M9183A provides users with the highest transactional speeds in the market at 4500 readings/s and 20,000 readings/s respectively. The M9183A also supports advanced triggering, capacitance measurements and more temperature functions, providing users with flexibility to support a broad range of measurements.

### Sequential Measurement




### Parallel Measurement



## LXI-interface instruments

The Agilent Technologies L4532A and L4534A are high resolution, standalone LXI digitizers. They offer 2 or 4 channels of simultaneous sampling at up to 20 MSa/s, with 16 bits of resolution. Inputs are isolated and can measure up to ±250 V to handle your most demanding applications. Input channels with the ability to measure waveforms up to 250 V are beneficial when analyzing high voltage and transient signals as seen in many applications. The L4532A and L4534A can make measurements that other products cannot. For example, since the ±250 V input range is combined with 16 bit analog to digital converters (ADCs), isolated front-end and low input offset allows a small voltage, such as a 250 mV, and a larger voltage, such as 250 V, to be measured at the same time.

The Agilent L4451A is a high performance 4 channels D/A converter that is LXI Class C compliant. With its small size and Ethernet connectivity, the D/A converter can be placed wherever your application needs it. The Agilent L4451A has four isolated analog channels that are useful to source bias voltages to your device under Test (DUT), to control your analog programmable power supplies, or use the outputs as set points for your control systems. You can use the standard waveforms provided or create your own with over 500,000 points. These points can be dynamically allocated among one or more channels and output as a point-to-point arb. Using this LXI instrument, you'll get all the benefits of an Ethernet connection, instrument Web server, standard software drivers and more. The L4451A has four independent, isolated channels that can output DC voltage up to ±16 V or DC current up to ±20 mA with 16 bits of resolution. The gain and offset can be adjusted on-the-fly.

## GPIB-interface instruments

The 33521A and 33522A provides you with the first 30 MHz Function/Arbitrary waveform generator in its class, 1– and 2– channel configurations, function pulses and point-by-point arbitrary waveforms in one instrument. Build many arbitrary waveforms without a PC with the embedded waveform builder. The 33521A and the 33522A provides the highest signal fidelity in their class, full bandwidth pulses and real point-by point arbitrary waveforms.

The 53220A represents a new generation of 350 MHz RF and Universal counter/timers with new performance and usability standards. The 53220A belongs to a family of first frequency counters with LXI-C compliance, the combination of high speed measurements and built-in analysis provide new functionality that has not previously been available in basic frequency counters/timers.

## Switch/Load Switching Unit (DC/AC)

The E6198B is a standard Switch/Load unit platform with standard Agilent global support that provides customers with an off-the-shelf switch/load box solution. Specifically designed for DUTs with high switching requirements with support for up to 30A current input with flyback protection and 48 channels (2A per channel). The E6198B supports inductive and capacitive loads, with single load, dual load, or quad-load configuration providing customers with the flexibility to support various DUTs for medium to high pin count applications. The E6198B is powered by a total of 3 power supplies ensuring optimal power supply for high pin count DUTs with dedicated power supplies for each voltage line.

| Agilent Loadcards Specifications | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Function | E6175A | E6176A | E6177A | E6177B | E6178A | N9377A | N9378A | N9379A |
| Number of channels (maximum) | 8 | 16 | 24 | 24 | 8 | 16, dual-load | 24, quad-load | 48, dual-load |
| Number of channels - unshared relays | 4 | 16 | 24 | 24 | 8 | 16 | 24 | 48 |
| Maximum current per channel | 7.5 A (15 A peak) | 7.5 A (15 A peak) | 3 A | 3 A | 30 A | 7.5 A (15 A peak) | 2 A | 2 A |
| Current measuring with sense resistor | Yes | Yes | No | Yes | No | Yes | No | No |
| Current measuring with current transducer | Yes | No | No | No | Yes | No | No | No |
| Flyback protection available (user installed) | Yes | Yes | No | No | Yes | Yes | No | No |
| Engineered for application | Inductive load | Common load | Low current | Low current | High current | High current dual-load | Low current quad-load | Low current quad-load |

# TS-8900 Ordering Information

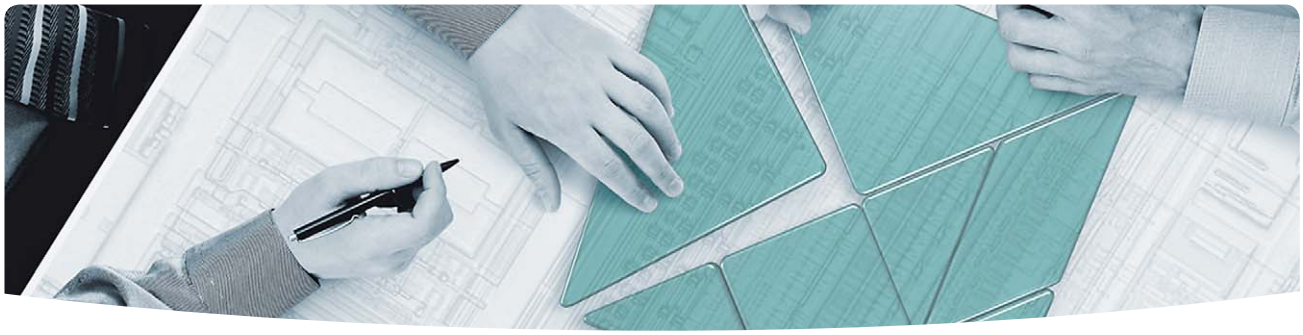
| Item | Description |
|---|---|
| U8971A-ATO | TS-8900 High Performance Functional Test System with ExpressConnect Interface -ATO |
| U8970A-OC-SPLCFG | Special Configuration Option Class |
| U8970A-OC-SLUCRD | SLU Cards and Wiring Option Class |
| U8970A-610 | E8782A Cable - ExpressConnect for TS8900 |
| U8970A-611 | E8782A Cable - Pin Matrix AUX |
| U8970A-612 | E8783A Cable - ExpressConnect for TS8900 |
| U8970A-613 | E8783A Cable - ExpressConnect Pin Matrix AUX |
| U8970A-614 | E6178B Cable - ExpressConnect for TS8900 |
| U8970A-615 | N9377A Cable - ExpressConnect for TS8900 |
| U8970A-616 | N9379A Cable - ExpressConnect for TS8900 |
| U8970A-270 | E8794A Cable - Custom Card to Matrix AUX |
| U8970A-260 | Pin Card Custom E8794A |
| U8970A-230 | Load Card E6178B - 8 Channels 30A |
| U8970A-231 | Load Card N9377A - Dual for 16 Channel |
| U8970A-232 | Load Card N9379A - High Density for 48 Channel |
| U8970A-233 | Load Card E6177B - 24 Channel |
| U8970A-234 | Load Card E6175A - 8 Channel |
| U8970A-210 | Pin Card Matrix E8782A - 40X4 with 24 Instrument Rows |
| U8970A-211 | Pin Card Matrix E8783A - 40X4 with 24 Instrument Rows |
| U8970A-201 | Switch/Load Unit E6198B |
| U8970A-623 | E6175A Cable - ExpressConnect for TS8900 |
| U8970A-624 | E6177B Cable - ExpressConnect for TS8900 |
| U8970A-OC-PXIMOD | PXI Instruments Option Class |
| U8970A-622 | PXI DIO M9187A Cable - ExpressConnect 64-BIT 0.3-50V |
| U8970A-621 | PXI Isolated V/I Source M9186A Cable - ExpressConnect |
| U8970A-620 | PXI Isolated DAC M9185A Cable - ExpressConnect 8-Channels |
| U8970A-619 | PXI SED M9216A Cable - ExpressConnect AUX 32-Channels |
| U8970A-618 | PXI SED M9216A Cable - ExpressConnect 32-Channels |
| U8970A-350 | PXI DIO M9187A - 64-BIT 0.3-50V |
| U8970A-340 | PXI Isolated V/I Source M9186A - 3W 100V Single Channel |
| U8970A-336 | PXI Isolated DAC M9185A - 16-Channels |
| U8970A-335 | PXI Isolated DAC M9185A - 8-Channels |
| U8970A-330 | PXI SED M9216A - 32-Channel 250KS/S 16-Bit 100V Input |
| U8970A-311 | PXI DMM M9183A - 7.5 Digit |
| U8970A-310 | PXI DMM M9182A - 6.5 Digit |
| U8970A-305 | PCIE Cable Interface M9021A - GEN 2 X8 |
| U8970A-300 | PXIE Chassis M9018A - 18-SLOT 3U 8GB/S |

# TS-8900 Ordering Information (continued)

| Item | Description |
|---|---|
| U8970A-OC-PWRSUP | Power Supply Option Class |
| U8970A-501 | DC Power Supply N5744A - 20V, 38A, 760W Including Cable |
| E2233B-ATO | Modular Power Supply - 1200W Max |
| E2233B-OC-Cables | N7602A Power Supply Cables |
| E2233A-CA6 | Cable - N6700B to Titan |
| E2233A-CA5 | Cable - N6700B to Titan and SLU |
| E2233A-CA4 | Cable - direct connect N6700A to E6198A SLU |
| E2233A-CA3 | Cables - Standard Prog Interconnect for N67XX Series PS |
| E2233A-CA2 | Cables for Modular Power supply and 6673A |
| E2233A-CA1 | Cables for Modular Power supply |
| E2233B-OC-Module | E2233B DC Power Modules |
| E2233B-004 | N6776A DC Power Module, 100V, 3A, 300W |
| E2233B-003 | N6775A DC Power Module, 60V, 5A, 300W |
| E2233B-002 | N6774A DC Power Module, 35V, 8.55A, 300W |
| E2233B-001 | N6773A DC Power Module, 20V, 15A, 300W |
| U8970A-505 | DC Power Supply N8734A - 20V, 165A, 3300W Including Cable |
| U8970A-504 | DC Power Supply N5765A - 30V, 50A, 1500W Including Cable |
| U8970A-503 | DC Power Supply N5764A - 20V, 76A, 1520W, Including Cable |
| U8970A-502 | DC Power Supply N5745A - 30V, 25A, 750W Including Cable |
| U8970A-506 | DC Power Supply N8735A - 30V, 110A, 3300W Including Cable |
| U8970A-OC-GPIBLXI | GPIB/LXI Instruments Option Class |
| U8970A-617 | LXI DAC L4451A Cable - ExpressConnect 4-Channels |
| U8970A-131 | LXI DAC L4451A, 4-Channels with Waveform Memory |
| U8970A-130 | LXI Digitizer L4534A, 20 MS/S 16-BIT 4-Channels |
| U8970A-125 | LXI Digitizer L4532A, 20 MS/S 16-BIT 2-Channels |
| U8970A-120 | GPIB/LXI Counter 53220A, 350MHZ 12 Digits/S 100PS |
| U8970A-115 | GPIB/LXI ARB 33521A - 30 MHZ 1-Channel |
| U8970A-110 | Reserved for GPIB/LXI DMM |
| U8970A-OC-Custom | Customization Option Class |
| U8970A-OC-Combo | Combo Material Option Class |
| U8970A-CL1 | SLU Slot Filler |
| U8970A-CH2 | Two Half Rack Instruments |
| U8970A-CH1 | One Half Rack Instrument |
| U8970A-CH0 | No Half Rack Instruments |
| U8970A-CF2 | Filler 3U for Missing Instrument |
| U8970A-CF1 | Filler 2U for Missing Instrument |
| U8970A-CB1 | Ballast Combo Material for Power Supplies |
| U8970A-CF3 | Filler 1U for Missing Instrument |
| U8970A-CF4 | Filler 1U with Feedthru Panel |

# TS-8900 Ordering Information (continued)

| Item | Description |
|---|---|
| U8970A-OC-Base | U8970A Base Option Class |
| U8970A-E01 | M/S KIT-Mass Interconnect ExpressConnect |
| U8970A-C02 | M/S Cabinet 2M Vertical |
| U8970A-C01 | M/S Cabinet 1.6M Vertical |
| U8970A-3PN | Wye 3-Phase w/ Neu 5-Wire for 220/380-240/415VAC |
| U8970A-HB1 | LXI Hub for LXI Instrumentation |
| U8970A-OC-APPSW | Application Software Option Class |
| U8970A-SW1 | TS-5000 Family Application Software 7.0V |
| U8970A-OC-ACCY | Accessories |
| U8970A-UP1 | APC Smart-UPS 3000VA USB and Serial RM 2U 230V |
| U8970A-SP1 | Strip Printer |
| U8970A-SH1 | Strip Printer Shelf for TS8900 |
| U8970A-RS1 | RS-232 Handheld Scanner Kit |
| U8970A-KM1 | Fixed Keyboard and Mouse Pad Tray |
| U8970A-UM1 | Add Manual Set |
| U8970A-A03 | Cable, VI Module, Standalone |
| U8970A-A02 | Cable, SED Module AUX, Standalone |
| U8970A-A01 | Cable, SED Module, Standalone |
| U8970A-OC-ACCUM | Accumulator Card Option Class |
| U8970A-601 | ExpressConnect Accumulator Card for TS8900 |
| E2235C-ATO | TS-8900 Family Controller, includes Core 2 Quad, 2048MB RAM, DVD-RW, Floppy Drive, Keyboard, Mouse |
| E2235C-OC-IPC | Industrial PC and all Accessories Option Class |
| E2235C-740 | LCD DISPLAY - 17 inch with Rack mount Kit |
| E2235C-730 | GPIB PCI Card 82350B - Agilent |
| E2235C-750 | Test Exec SL SW License - Rev 7.0 Installed on TS8900 Controller |
| E2235C-722 | MS Windows XP Pro |
| E2235C-705 | PCI Digital I/O Card and Cable - 32-Channels |
| E2235C-704 | PCI Softing CAN Card and Cable - MacPanel 75 and ExpressConnect |
| E2235C-703 | PCI CAN Plug-In Board - 16Bit Microcontroller |
| E2235C-701 | DIO Card - 32-Channel W2500VDC with Isolation |
| E2235C-700 | Serial Port Expander - 8 Channel with Unterminated Connector Cable |
| E2235C-CORE | Core Material |
| U8970A-OC-ICAOPT | TS-8900 Interface Connector Adapter Options |
| U8970A-D01 | TS-8900 ExpressConnect Diagnostics Kit |



## The Modular Tangram

The four-sided geometric symbol that appears in this document is called a tangram. The goal of this seven-piece puzzle is to create identifiable shapes—from simple to complex. As with a tangram, the possibilities may seem infinite as you begin to create a new test system. With a set of clearly defined elements—hardware, software—Agilent can help you create the system you need, from simple to complex.

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